



General Certificate of Secondary Education
2012–2013

Double Award Science: Chemistry

Unit C1

Foundation Tier

[GSD21]



MONDAY 20 MAY 2013, AFTERNOON

TIME

1 hour.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
Write your answers in the spaces provided in this question paper.
Answer **all ten** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is 70.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.
Quality of written communication will be assessed in Question **10(b)**.
A Data Leaflet, which includes a Periodic Table of the Elements, is included in this question paper.

Centre Number

71

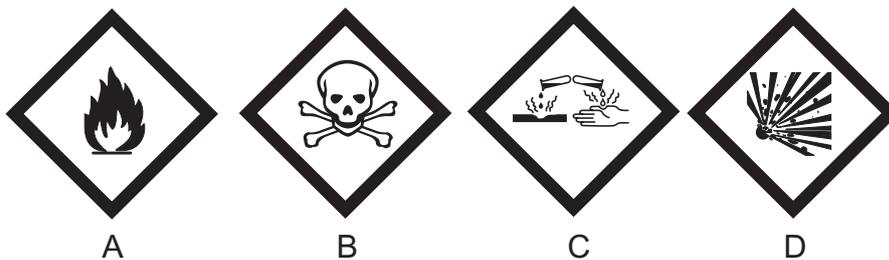
Candidate Number

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Question Number	Marks
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	

Total
Marks



- 1 The four hazard symbols, A, B, C and D below are used on bottles of chemicals to warn of danger.



- (a) Give two other reasons why hazard symbols are useful.

1. _____

2. _____

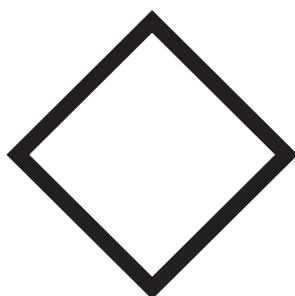
_____ [2]

- (b) Which hazard symbol, A, B, C, or D would you find on a bottle containing a

(i) chemical which is corrosive? _____

(ii) chemical which is explosive? _____ [2]

- (c) In the diamond below draw the general hazard symbol you would expect to see on a bottle containing a chemical which needs to be handled with caution.



[1]

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Marks	Remark

- 2 (a) Complete the table below to show the colour of universal indicator and the pH of three solutions.

Solution	Colour of universal indicator	pH
lemon juice	orange	
baking soda solution		9
cleaning fluid	purple	

[3]

- (b) From the table choose a solution which is:

(i) a weak acid _____ [1]

(ii) a weak alkali _____ [1]

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Marks	Remark

3 Iodine is an element in Group 7 of the Periodic Table.

(a) What is the name given to Group 7 elements? Circle the correct answer.

alkali metals halogens noble gases transition metals [1]

(b) Choose **two** words from the list below which best describe iodine at room temperature. Circle the correct answers.

dark grey liquid red-brown
green gas solid [2]

Iodine exists as diatomic molecules.

(c) What is the formula of iodine? _____ [1]

Iodine reacts with sodium to form a white crystalline solid.

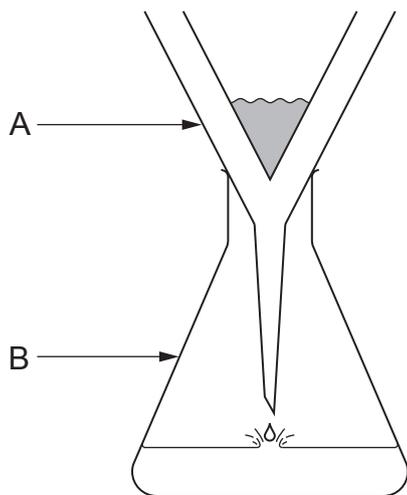
(d) Name the white crystalline solid and give its formula.

name _____

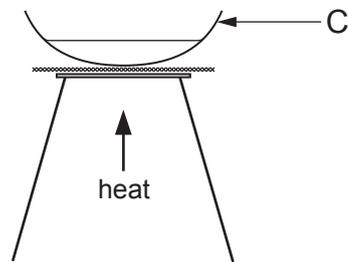
formula _____ [2]

Examiner Only	
Marks	Remark

- 4 Salt can be obtained from a mixture of sand, salt and water by filtration followed by evaporation as shown in the diagrams below.



filtration



evaporation

- (a) Name the pieces of apparatus A, B and C.

A _____

B _____

C _____ [3]

- (b) On the filtration diagram above label the **filtrate** and the **residue**. [2]

- (c) Name a piece of apparatus which could be used to provide the heat.

_____ [1]

- (d) Why can copper(II) sulfate **not** be separated from a mixture of copper(II) sulfate and water by filtration?

_____ [1]

Examiner Only

Marks Remark

- 5 The table below lists the melting points and boiling points of substances A, B, C and D.

Substance	Melting point /°C	Boiling point /°C
A	0	100
B	808	1465
C	114	444
D	-7	59

- (a) What is meant by the term **melting point**?

_____ [2]

- (b) Which two substances, A, B, C or D, are solids at room temperature (20°C)?

_____ and _____ [1]

- (c) What state is substance D in at 70°C?

_____ [1]

- (d) What is the name given to the change of state from a solid to a gas?

_____ [1]

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Marks Remark

6 (a) You may use your Data Leaflet to help you answer this question.

Circle the correct answer.

(i) The element with the symbol **Pd** is:

potassium phosphorus palladium plutonium [1]

(ii) The correct symbol for the aluminium **ion** is:

Al Al³⁺ Al⁺ Al³⁻ [1]

(iii) The compound with the formula **Al₂(SO₄)₃** is:

aluminium sulfur oxide aluminium sulfide aluminium sulfate aluminium sulfite [1]

(iv) The formula **Ca(OH)₂** means:

2 calcium and 2 hydroxide ions 1 calcium and 2 hydroxide ions 1 calcium, 2 oxygen and 2 hydrogen ions 1 calcium, 1 oxygen and 2 hydrogen ions [1]

(b) Balance the symbol equation below which describes the reaction between sodium oxide and hydrochloric acid.

Na₂O + HCl → NaCl + H₂O [2]

Examiner Only	
Marks	Remark

- 7 (a) Select words from the list below to complete the paragraph about the atomic structure of phosphorus.

electrons protons neutrons shells nucleus

Phosphorus has an atomic number of 15. This means it has

15 _____ in each atom.

It has 15 _____ orbiting in _____

around the centre of the atom. [3]

- (b) Name the particles with a positive charge found in an atom of phosphorus.

_____ [1]

The mass number of phosphorus is 31.

- (c) What other information does this tell you about the atomic structure of phosphorus?

_____ [1]

- (d) A molecule of phosphene is formed from one atom of phosphorus and three atoms of hydrogen.

- (i) What is the formula of phosphene?

_____ [1]

- (ii) Name the type of bonding you would expect phosphene to have.

_____ [1]

Examiner Only

Marks Remark

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(Questions continue overleaf)

- 8 Graphene is an allotrope of carbon. It consists of a single layer of carbon atoms joined together by covalent bonds. It is 200 times stronger than steel. It conducts electricity as efficiently as copper and is a good conductor of heat. It is almost completely transparent with possibly the highest melting point known.

(a) What are **allotropes**? Tick (✓) the correct answer.

Atoms of the same element with a different mass number.

Different forms of the same element in the same physical state.

Two or more atoms held tightly by a covalent bond. [1]

(b) Explain why graphene is said to be an element.

_____ [1]

(c) Give two pieces of information from the passage which suggest that graphene might be thought to be **metallic**.

1. _____

2. _____ [2]

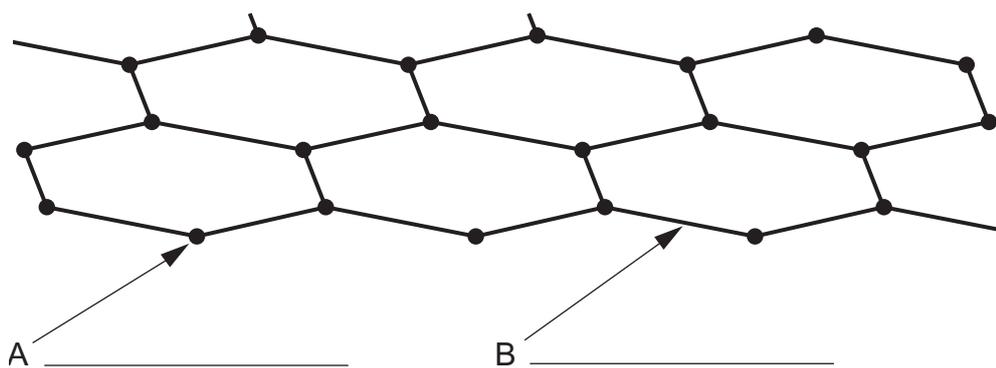
(d) Give two pieces of information from the passage which suggest graphene might be thought to be **non-metallic**.

1. _____

2. _____ [2]

Examiner Only	
Marks	Remark

- (e) Using the information in the passage, label A and B in the diagram of graphene below.



[2]

- (f) Graphene was discovered in 2004. It has many outstanding properties.

Choose one property of graphene from the passage and **suggest** a use based on the property.

property	
use	

[1]

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Marks Remark

9 A small piece of sodium metal was added, using tongs, to a trough of water.

(a) How is sodium stored in the laboratory?

_____ [1]

(b) Why was a **small** piece of sodium added to the water?

_____ [1]

(c) Why was the sodium handled with tongs instead of using fingers to lift it?

 _____ [2]

(d) Choose **three** statements which describe what happens when sodium is placed into the water.

Put a tick (✓) in the three correct boxes.

bubbles of carbon dioxide gas form <input type="checkbox"/>	melts into a silvery ball <input type="checkbox"/>
burns with a lilac flame <input type="checkbox"/>	sinks to the bottom then floats to the top <input type="checkbox"/>
moves quickly across the surface of the water <input type="checkbox"/>	eventually disappears <input type="checkbox"/>

[3]

(e) In which group of the Periodic Table would you find sodium?

_____ [1]

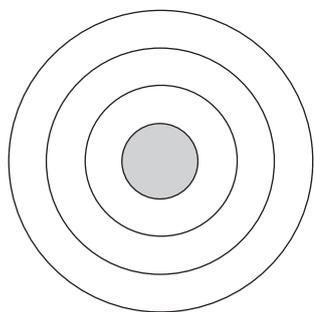
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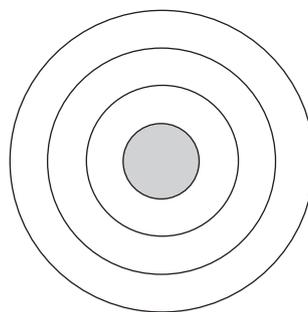
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10 Hot magnesium metal will burn in chlorine gas to form magnesium chloride.

(a) Complete the diagrams below to show **all** the electrons in a magnesium atom and a chlorine atom.



magnesium atom



chlorine atom

[2]

In part (b) you will be assessed on your written communication skills including the use of specialist scientific terms.

(b) Explain fully, **in terms of electrons**, how the atoms of magnesium and chlorine react together to form magnesium chloride.

Include in your answer the charges on the ions and an explanation of how the ions are held together in the compound.

[6]

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Marks

Remark

(c) Using a **dot and cross** diagram, draw a molecule of hydrogen.

[2]

(d) Describe a test for hydrogen gas.

[2]

THIS IS THE END OF THE QUESTION PAPER

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Marks	Remark

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